

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : MATSUSHITA ELECTRIC IND CO LTD

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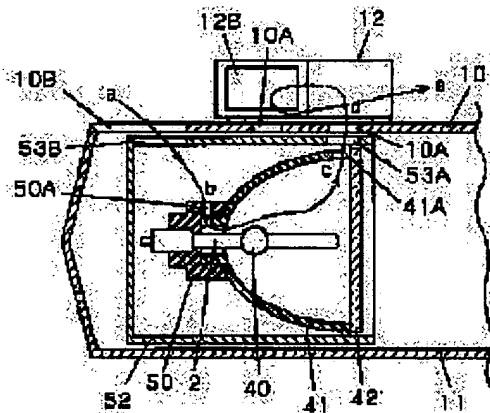
(72)Inventor : OKADA TAKEHIRO
HOSHINO MAKOTO

(54) LAMP AND LIQUID CRYSTAL PROJECTION DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To plurally cool light emitting tubes, reflectors and seal parts on the same condition and to prevent temperature rise at the light emitting tube and the seal part caused by hermetic sealing by providing plural lamp cooling means for respectively controlling temperature corresponding to plural lamps.

SOLUTION: Holes 10A and 10B for an air ventilation path are opened at specified positions on an illumination cover 10. Holes 53A and 53B for an air ventilation path are also opened on a lamp house 52. An insulator 50 is integrally attached to the reflection mirror 41 of the lamp 2 and a hole 50A communicating with the light emitting tube 40 is formed on the insulator 50. A notched hole 41A is opened at one part of the fixed surface of a front surface glass 42 and the mirror 41 and communicates with the exhaust hole 12B of a fan 12. Therefore, by driving and rotating the fan 12, a ventilation path shown by arrows and marks a-b-c-d-e is formed. As a result, heat from the tube 40 and the like is discharged to the outside so as to cool the tube 40 and the like. Then, the heat caused by the lamp is discharged to the outside from a louver.



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CLAIMS

[Claim(s)]

[Claim 1] Liquid crystal projection equipment characterized by providing the following Two or more lamps A cooling means which was attached respectively corresponding to this lamp A reflective means to reflect light from said lamp in the predetermined direction A collimation means which makes light abbreviation parallel light with said reflective means, and the 1st lens array which divides the flux of light of said abbreviation parallel light, The 2nd lens array which consists of two or more lenses and carries out incidence of the light from said 1st lens array, A color separation light source means to divide said two or more lamps into red, blue, and each green light, Said red, blue, a liquid crystal panel that modulates each green light, and a synthetic optical means which compounds light modulated by said liquid crystal panel, A projection lens which projects light compounded, said lamp, said 1st [the], the 2nd lens array, said cooling means, said collimation means and said liquid crystal panel, said color separation light source means, said synthetic optical means, and a main part case that connotes said projection lens etc.

[Claim 2] A cooling means is liquid crystal projection equipment according to claim 1 which is the centrifugal fan which consists of an air delivery and inhalation opening, and is characterized by having seen from lamp light shaft orientations and having arranged to juxtaposition among the upper part of said lamp, or the lower part at either.

[Claim 3] It is liquid crystal projection equipment according to claim 1 to 2 which is the direction as the direction of a opening of a louver for exhausting outside a main part case where a wind from a delivery of a cooling means is the same, and is characterized by for said louver having made a projection lens the before side, and leaning it to slanting front.

[Claim 4] Liquid crystal projection equipment according to claim 1 to 3 characterized by being the cooling structure of a lamp sealed with an arc tube, an insulator which has the inlet which carries out inhalation of air to a luminescence tubeside while said arc tube is fixed, a reflecting mirror with which an exhaust port which exhausts air which fixes said insulator and enters from said inlet was established in one, and cover glass joined to said reflecting mirror.

[Claim 5] A centrifugal fan which is a cooling means is liquid crystal liquid crystal projection equipment according to claim 1 to 4 characterized by attracting exhaust air from an exhaust port of a reflecting mirror, and exhausting from a louver of a main part case.

[Claim 6] A lamp characterized by having an insulator with an inlet which fixes an arc tube and said arc tube, and carries out inhalation of air to a luminescence tubeside, a reflecting mirror which established in one an exhaust port which exhausts air which fixes said insulator and enters from said inlet, and a front windshield which obturates a disconnection side of said reflecting mirror.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the liquid crystal projection equipment which cools two or more lamps especially about the liquid crystal projection equipment which carries out expansion projection of the image of liquid crystal panels.

[0002]

[Description of the Prior Art] The equipment which carries out expansion projection of the image of a liquid crystal panel from the former using the light sources, such as metal halide, is put on the market. It is condensed by the liquid crystal panel via a mirror etc., and the light emitted from the light source copies this out on a screen through a projection lens. recently, a projection image is seen by the big screen also in the bright room -- as -- high -- lamps, such as metal halide which a brightness thing appears and is the light source, -- a high increase in power -- and it was point-light-source-ized and the rate for Mitsutoshi of optical system has improved. Although a configuration like drawing 5 is generally used as optical system using these lamps in many cases, in order to raise brightness more than it, the projector with the optical system which uses a lamp as two or more LGTs has also appeared.

[0003] As a basic configuration of the projection optical system which shows 2 LGT lighting, the configuration of JP,5-29320,A of drawing 6 (a) and (b) or JP,5-49569,A of drawing 7 is proposed, for example. Generally, ally NINGU fixing of the arc tube 20 is carried out an ellipse or near the focus of the reflecting mirror 21 of a paraboloid, and through the condensing system components which consist of the 1st lens array 24 which has an integrator function for carrying out homogeneity lighting of the field lens 23 or the screen, and the 2nd lens array 25, the flux of light from an arc tube is illuminated by the liquid crystal panel 26, and after color composition is carried out by the crossing prism 28, expansion projection of it is carried out with a projector lens 27 at a

[0004] An outline is shown about the general cooling structure at the time of making the lamp of drawing 7 into two. In order that the upper part of an arc tube 20 may be kept at about 950 degrees C or less and it may keep the seal section at 350 degrees C or less, forced cooling of the lamp is carried out by the fan 30 from the lamp back of drawing in many cases. However, in the case of the structure sealed with a reflecting mirror and a front windshield, for example like an ultrahigh pressure mercury lamp, temperature control is difficult.

[0005]

[Problem(s) to be Solved by the Invention] Also when [which was another] in the case of the 2 above-mentioned lighting methods (for example, the case of the structure sealed with a reflecting mirror and a front windshield like an ultrahigh pressure mercury lamp) preparing an air vent near temperature control and a front windshield and cooling, in cooling by the axial flow fan from back, it was imperfect and was not able to press down a temperature rise.

[0006] Moreover, also in 2 lighting methods of JP,5-29320,A or JP,5-49569,A of drawing 7 , from back, the same cooling structure is adopted and it is. The cooling structure of lamp cooling at the time of 2 LGTs and the whole set had a problem in the interior temperature of a forge fire and lamp cooling nature which will be carried out if it is made a compact. Furthermore, it was difficult to carry out temperature control of the two lamps on the same conditions.

[0007] In the lamp cooling structure of the liquid crystal projector which this invention solves the above-mentioned technical problem, and has the optical system of plurality, for example, 2 LGT methods, an arc tube, A reflector, the seal section, etc. enable two or more (2) cooling on the same conditions. Moreover, it aims at offering liquid crystal projection equipment with effects, such as prevention of the temperature rise of the arc tube produced since a fixed ventilation path can be acquired on a lamp and it is sealed, and the seal section, a predetermined temperature control, and exhausting outside efficiently.

[0008]

[Means for Solving the Problem] In order to solve said technical problem, liquid crystal projection equipment of this invention was considered as a configuration which established two or more lamp cooling means to control temperature corresponding to two or more lamps, respectively. Moreover, said cooling means is a centrifugal fan which consists of an air delivery and inhalation opening, and was considered as a configuration which looks at from lamp light shaft orientations, and is arranged to juxtaposition at the upper part or the lower part of said lamp. Moreover, it is the direction as sense of a louver for exhausting outside a main part case where a wind from a delivery of a cooling means is the same, and said louver was taken as a configuration which makes a projection lens a before side and leans it to slanting front. Furthermore, it considered as cooling structure of a lamp sealed with an insulator which has the inlet which carries out inhalation of air in an arc tube while an arc tube and said arc tube are fixed, a reflecting mirror with which an exhaust port which exhausts air which fixes said insulator and enters from said inlet was established in one, and cover glass joined to said reflecting mirror. Furthermore, a centrifugal fan which is a cooling means attracted exhaust air from an exhaust port of a reflecting mirror, and considered it as a configuration exhausted from a louver of a main part case.

[0009] When [another] preparing an air vent near temperature control of lamp structure sealed with a reflector and a front windshield, and a front windshield and cooling by two or more lamp cooling by these configurations, by cooling by axial flow fan, an imperfect temperature rise can be improved from back. Moreover, it is possible to be able to press down internal temperature and a lamp temperature rise, where cooling structure of lamp cooling at the time of 2 LGTs and the whole set is used as a compact, to unite, and to carry out temperature control of the two lamps on the same conditions. Furthermore, a lamp can acquire a fixed ventilation path in a form almost near sealing, and can control a temperature rise of an arc tube and the seal section, and it is possible to exhaust hot blast in the direction of a front face. As mentioned above, even when two lamps are used, liquid crystal projection equipment which carries out efficient cooling on the same conditions is obtained.

[0010]

[Embodiment of the Invention] Two or more lamps which fixed the arc tube near the focal location of the reflecting mirror with which the 1st invention in this invention was equipped with the concave reflector, The cooling means of a same number pair for controlling the temperature of a presser-foot position for the temperature rise of said lamp, A reflective means to reflect the light from said two or more lamps in the predetermined direction, and the collimation means which makes light abbreviation parallel light with said reflective means, The 1st lens array which divides the flux of light of said abbreviation parallel light, and the 2nd lens array which consists of two or more lenses and carries out incidence of the light from said 1st lens array, A color separation light source means to divide said two or more lamps into red, blue, and each green light, Said red, blue, the liquid crystal panel that modulates each green light, and the synthetic optical means which compounds the light modulated by said liquid crystal panel, The projection lens which projects the light compounded, and said lamp, said 1st [the], the 2nd lens array, Since it constitutes from a main part case which connotes said cooling means, said collimation means, said liquid crystal panel, said color separation light source means, said synthetic optical means, said projection lens, etc., even when two or more lamps are used, the liquid crystal projection equipment which cools on the same conditions can be obtained.

[0011] Moreover, by the 2nd invention, the cooling means is a centrifugal fan which consists of an air delivery and inhalation opening, and by seeing from lamp light shaft orientations and arranging in the upper part or the lower part of said lamp at juxtaposition, even when two or more lamps are used, the liquid crystal projection equipment which carries out efficient cooling which does not spread a heat source inside a set can be obtained.

[0012] moreover , the wind from the delivery of a cooling means be the same direction as the sense of the louver for exhausting outside a main part case in the 3rd invention , and said louver can obtain the liquid crystal projection equipment which can be use without caring about the optical leak and the noise which appear in anterior part in order to see from the width or the posterior part of a main part , when using a projector by having make the projection lens into the before side and having lean it to a slanting front .

[0013] Moreover, the insulator which has the inlet which carries out inhalation of air in an arc tube by the 4th invention while an arc tube and said arc tube are fixed, Since it is the cooling structure of the lamp sealed with the reflecting mirror with which the exhaust port which exhausts the air which fixes said insulator and enters from said inlet was established in one, and the cover glass joined to said reflecting mirror, The temperature control of each part of a lamp is easy, and the liquid crystal projection equipment exhausted outside without extending a lamp heat source inside a set can be obtained.

[0014] Furthermore, since the centrifugal fan which is a cooling means attracts the exhaust air from the exhaust port of a reflecting mirror and it exhausts from the louver of a main part case by the 5th invention, the liquid crystal projection equipment exhausted outside without extending a lamp heat source inside a set similarly can be obtained.

[0015] Furthermore, an insulator with the inlet which the 6th invention fixes an arc tube and said arc tube, and carries out inhalation of air to a luminescence tubeside, It is what was used as the lamp characterized by having the reflecting mirror which established in one the exhaust port which exhausts the air which fixes said insulator and enters from said inlet, and the front windshield which obturates the disconnection side of said reflecting mirror. The heat which a lamp produces can be efficiently discharged with a fan's etc. means, heat is spread to the RAMBU circumference or the temperature rise of a lamp edge strip is prevented to it. Hereafter, the gestalt of operation of this invention is explained using drawing 4 from drawing 1.

[0016] (Example 1) Drawing 1 is the plan showing the whole liquid crystal projection equipment in the 1st example of this invention. The cross section showing the relation between the lamp with which drawing 2 looked at drawing 1 from cutting-plane-line S-S, a fan, and the main part louver section, and drawing 3 are the front view showing a part of drawing 2. Moreover, drawing 4 is the plan having shown the layout of 2 LGT optics.

[0017] As shown in drawing 1 and drawing 4, alignment immobilization of the layout of 2 LGT composition by this invention is carried out near the focal location of **** 1 of the ellipse reflecting mirror 41 in an arc tube 40, and the lamp 1 and lamp 2 which are lidded by the front windshield 42 are used two. It is reflected in the upper part side of drawing 2 by the synthetic prism 35 90 degrees, and 2 LGT composition is mostly made into parallel light with a collimator lens 5, carries out incidence to each cel of the 1st lens array 7, and is converged on each cel to which it is divided into much minute flux of lights, and the 2nd lens array 8 corresponds. The same configuration is sufficient as the 1st lens array 7 and the 2nd lens array 8. The emitter images 29a and 29b of lamps 1 and 2 are formed in right and left of each cel like drawing 8 at the 2nd lens array 8, respectively.

[0018] The mirrors 28 which are a color separation system, the field lens 32, the synthetic prism 30, and the projection lens 31 are almost equivalent to the conventional projector optical system after it. Moreover, these optics were sandwiched by lighting covering top of drawing 1 10, and bottom of lighting covering 11, and two or more holes 10A and 10B of airstream popular use which have the predetermined path which misses the heat source of lamps 1 and 2 in lighting covering top 10 are vacant as for them. The fans 12 and 13 who cool and do temperature control of the lamps 1 and 2 according to an individual, respectively have clung to lighting covering top 10. Said fans 12 and 13 are centrifugal fans called a sirocco fan, and the inhalation-of-air section has turned to the lamp side.

[0019] In order to carry out the endocyst of the above-mentioned each part material to the main part case 14 and to lower internal temperature to the main part case 14, the louver section 15 is unified near fans' 12 and 13 exhaust port 12B, and the 13B. With a natural thing, the louver section 15 comes to arrange opening 15A for every predetermined gap.

[0020] Drawing 2 is drawing showing the relation between the direction of a opening of said louver section, and a fan. In order to fill the crevice between the fan exhaust ports 12A and 13A and the louver section 15, the fan guide 16 has clung, respectively.

[0021] Drawing 3 shows the mimetic diagram of the relation between the structure of the lamp 2 in this invention, and said lamp 2 and fan 12. An insulator with the inlet which the lamp in this invention fixes an arc tube and said arc tube, and carries out inhalation of air to a luminescence tubeside, It is what was used as the lamp characterized by having the reflecting mirror which established in one the exhaust port which exhausts the air which fixes said insulator and enters from said inlet, and the front windshield which obturates the disconnection side of said reflecting mirror. The heat which a lamp produces can be efficiently discharged with a fan's etc. means, heat is spread to the RAMBU circumference or the temperature rise of a lamp edge strip is prevented to it. In detail, the lamp 2 is surrounded by the outline closure condition with the lamp house 52. Moreover, said lamp house 52 is surrounded by the outline closure condition between lighting covering top 10 and bottom of lighting covering 11. The holes 10A and 10B for air ventilation flues (ventilation flue) are carrying out the opening to said lighting covering top 10 in the predetermined location. The holes 53A and 53B for air ventilation flues (ventilation flue) are carrying out the opening also to said lamp house 52.

[0022] It clings in [the reflecting mirror 41 of a lamp 2 / an insulator 50] one, and hole (ventilation flue) 50A which leads to an arc tube 40 is prepared in the insulator 50. Moreover, the opening of the notch hole 41A (ventilation flue) is carried out to a part of root face of a front windshield 42 and a reflecting mirror, and it is open for free passage for a fan's exhaust port.

[0023] Therefore, if drive rotation of the fan 12 is carried out, the ventilation flue (ventilation flue from which enters from Sign a and it escapes to Sign e side) shown by the arrow head and sign a-b-c-d-e of drawing 3 will be formed. Consequently, heat, such as an arc tube 40, can be missed outside and it can cool. and into a liquid crystal projector main part, the heat resulting from a lamp comes out, and does not leak, but it is discharged outside a louver.

[0024] while the ventilation path of this invention takes in a low-temperature wind from vent 50A (drawing b mark) of

an insulator 50 and the arc tube in a reflecting mirror 41 is cooled -- the hole of ventilation section 53A [of a hole (drawing c mark) and a lamp house 53], and lighting covering top 10 -- a passage -- a fan -- the exterior -- exhausting -- having -- a lamp -- the path which exhausts a heat source efficiently is constituted.

[0025]

[Effect of the Invention] As mentioned above, according to this invention, even when two or more lamps are used, it can prevent spreading heat out of a lamp house, and efficient cooling of a lamp is enabled. Moreover, since it sees from the width or the posterior part of a main part when using a projector, a louver is leaned forward, and it can be used by having doubled the sense of a centrifugal fan, without caring about the optical leakage and noise which appear in anterior part. Furthermore, since the lamp was made into the cooling structure closed in the outline seal condition with a reflecting mirror and cover glass, the temperature control of each part of a lamp is easy for it. Moreover, in order that the centrifugal fan which is a cooling means may attract the air in a reflecting mirror and may discharge it from the opening of the louver section, it does not extend the heat of a lamp inside a set, but prevents the temperature rise of configuration members other than a lamp.

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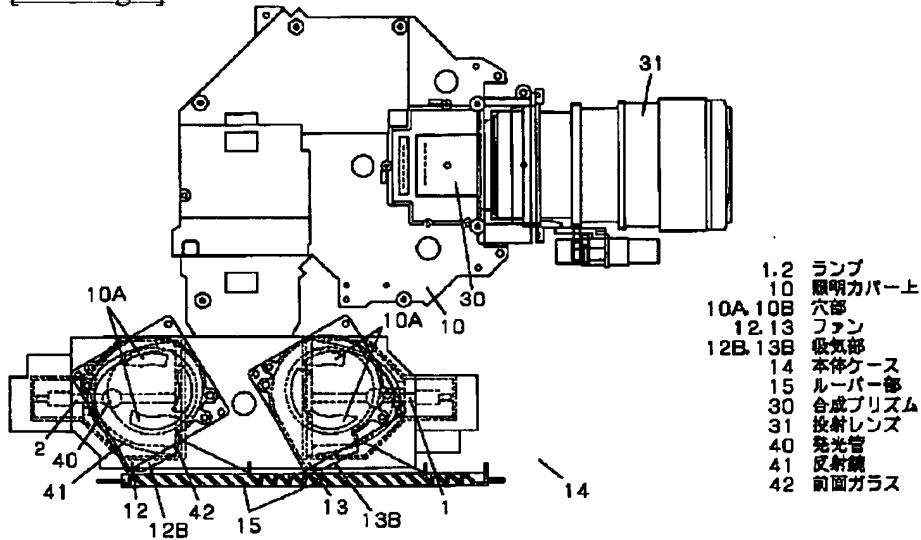
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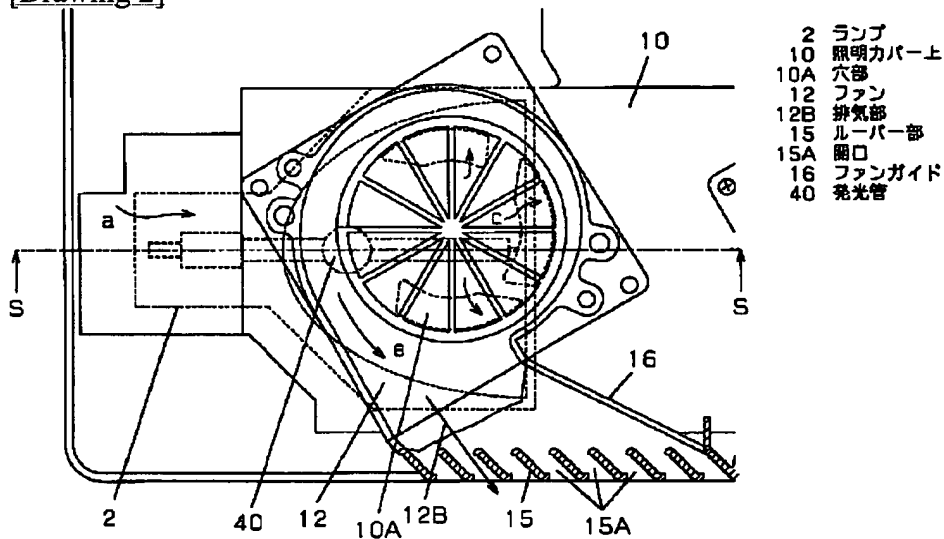
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DRAWINGS

[Drawing 1]

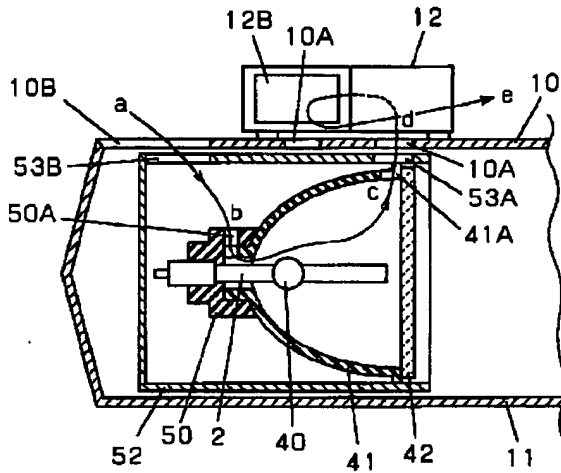


[Drawing 2]



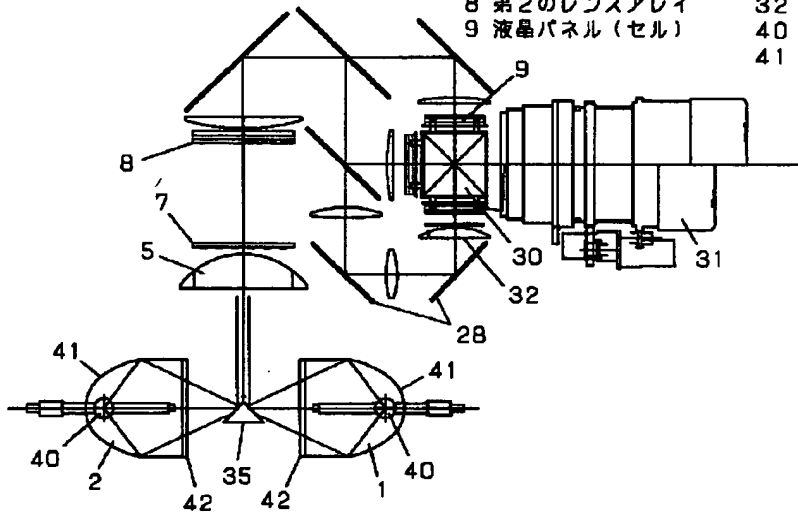
[Drawing 3]

- 2 ランプ
 10 照明カバー上
 10A, 10B, 50A 穴 (通風路)
 53A, 53B
 11 照明カバー下
 12 ファン
 12B 排気口
 40 発光管
 41 反射鏡
 41A 切欠穴 (通風路)
 42 前面ガラス
 50 端子
 52 ランプハウス

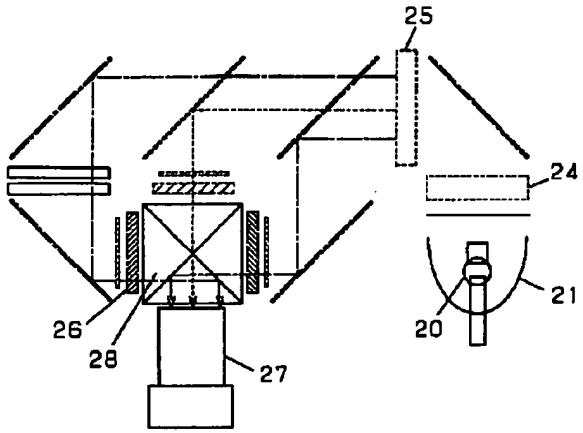


[Drawing 4]

- 1, 2 ランプ
 5 コリメータレンズ
 7 第1のレンズアレイ
 8 第2のレンズアレイ
 9 液晶パネル (セル)
 28 ミラー
 30, 35 合成プリズム
 31 投射レンズ
 32 フィールドレンズ
 40 発光管
 41 反射鏡



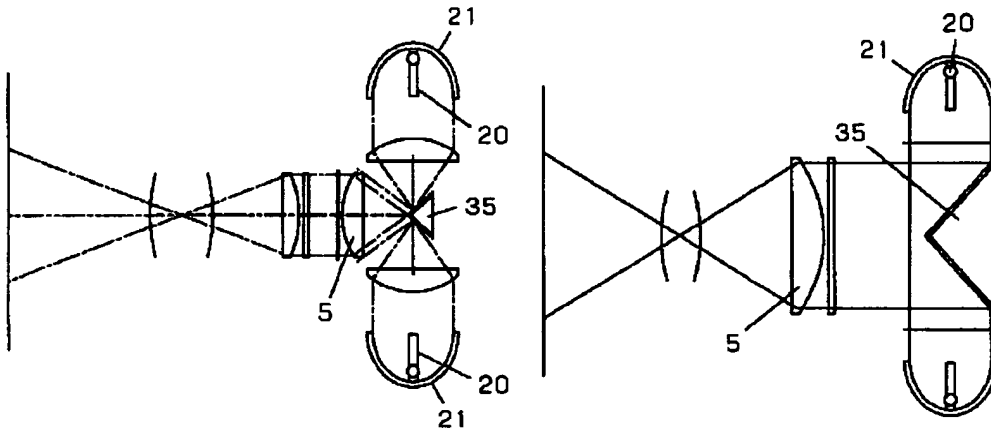
[Drawing 5]



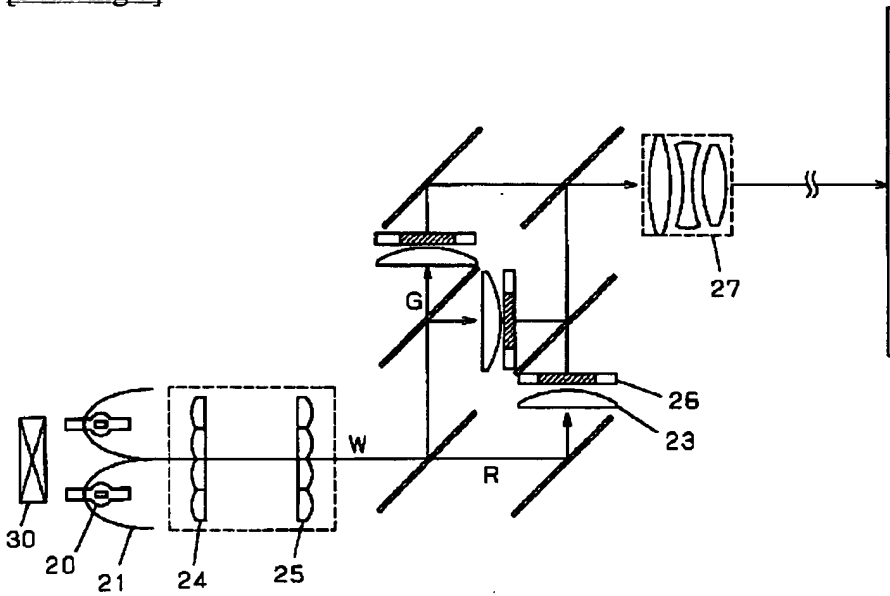
[Drawing 6]

(a)

(b)

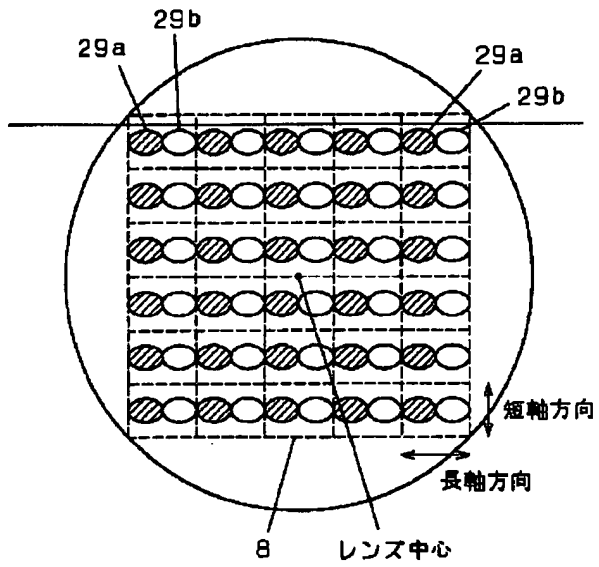


[Drawing 7]



[Drawing 8]

29a, 29b 発光体像



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